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XLV. *Observation of the Transit of Venus, and other Astronomical Observations, made at Gibraltar; contained in a Letter to the Astronomer Royal from Lieutenant Jardine.*

To regulate the clock.

Read Dec. 7, 1769. **A**N equal altitude instrument was fixed (nearly such as is described in Smith's Optics, vol. II. p. 328), on which was mounted a small telescope with cross hairs.

		Sun's upper limb touched the ho- rizontal hair at			Sun's lower limb touched the ho- rizontal hair at		
		h	'	"	h	'	"
June 1	Morning	8	32	43	8	35	8
	Afternoon	3	24	33	3	22	0
2	Morning	8	32	20	8	34	46
	Afternoon	3	25	4	3	22	36
4	Morning	8	32	27	8	35	13
	Afternoon	3	25	27	3	22	47
5	Morning	8	32	35	8	35	10
	Afternoon	3	25	53	neglected		

TRANSIT OF VENUS.

By three observers, with two $7\frac{1}{2}$ feet refractors, and one 2 feet reflecting telescope.

	h	'	"
June 3, Venus's 1st external contact with the Sun, at	6	49	58
1st internal contact with the Sun, at	7	7	11
Sun set behind a hill	7	8	3
Clock before mean time	0	1	8,8

Y y 2

For

For the LATITUDE of the place.

Observed by a Hadley's quadrant, divided into minutes, the double meridian altitudes of Jupiter and Cor Scorpil, reflected from water.

Double meridian altitude of Jupiter.

	°	'	"
May 30	=	77	6
June 14	=	77	50
17	=	77	55 30
21	=	78	3 30
By another observer,	=	78	3 0
June 22	=	78	4 0
29	=	78	10 45
July 4	=	78	14 0

Double meridian altitude of Cor Scorpil.

	°	'	"
June 28	=	56	7
29	=	56	5
July 7	=	56	6 30
8	=	56	5 0

Clear weather, in general, during these observations; and }
 Fahrenheit's thermometer, in the middle of the day, between } 75 and 80
 in the night, between } 68 and 71

For the LONGITUDE of the place.

	h	'	"
May 30 Emerfion of Jupiter's first fatellite	12	59	56
Clock before mean time	0	1	2

May 31 Emerfion of Jupiter's 2d fatellite	10	51	51
Clock before mean time	0	1	3½

June 8 Emerfion of Jupiter's first fatellite	9	22	34
Clock before mean time	0	1	16½

June 15 Emerfion of Jupiter's first fatellite	11	15	54½
Clock before mean time	0	1	28

} These two are
 moft to be de-
 pended upon.

June 25 Immerfion of Jupiter's 3d fatellite	11	59	56
Clock before mean time	0	1	44

{ uncertain to
 perhaps 5 or 6"

July 8 Emerfion of Jupiter's first fatellite	11	30	57
Clock before mean time	0	2	4

ECLIPSE OF THE SUN.

		h ' "	
June 4	First contact at	6 6 54	seen perhaps a little too late.
	Last contact at	7 19 28	exact.
	Clock before mean time	0 1 9	

Elev. of ☉'s l. limb by Hadley's quad. at $\left\{ \begin{array}{l} \text{1st contact } 14 \text{ } 41 \\ \text{2d contact } 28 \text{ } 55 \end{array} \right\}$ both exact.

Dip of the horizon, for 160 feet above the level of the sea, is to be allowed.

S I R,

I Have been disappointed in the pleasure I promised myself, when I saw you, of observing some occultations of fixt stars, by the Moon, &c. We shall be glad, if these observations can be of any service. We have endeavoured to discover to you the degree of dependance to be placed thereon.

With regard to the clock, we conclude from these equal altitudes (correcting for difference of declination, &c.), that, on the 3d of June, it was before mean time 1' 8'',8. You will easily discover if there is any error. We afterwards regulated by frequent equal altitudes, by a meridian line on the bottom of a window, and by the setting of stars behind some solid buildings.

The latitude appears, from these double altitudes, to be somewhere between 36° 3', and 36° 4'; but from more correct declinations, &c. you will be able to determine it more precisely.

For the eclipse, we had no micrometer, nor any other method of determining the quantity of it.

I

To

To the eye, between $\frac{1}{4}$ th or $\frac{1}{5}$ th of the Sun's diameter seemed to be eclipsed. Though the beginning be rather incorrect, the end may be depended on.

We shall be glad if you can determine, from hence, the latitude and longitude of the place, and to know the result of the discoveries made in our system, by the observations of the late transit, if you will favour us.

I am,

S I R,

Your most obedient,

humble servant,

Gibraltar, July 14,
1769.

Alexander Jardine.

By re-computing these observations, I find, that the external contact of Venus happened at $6^h 51' 8''$, the internal contact at $7^h 8' 21''$, the beginning of the eclipse of the Sun at $18^h 8' 0''$, and the end at $19^h 20' 33''$, all apparent time; and that the latitude of the place, by the mean of the 4 altitudes of Cor Scorpii, is $36^\circ 4' 44''$, N. The dip of the horizon of the sea, for an elevation of 160 feet, may be reckoned $12' 5''$.

Nevil Maskelyne.